Acknowledgments

This brochure was written and designed by John Lewis, a Senior Forecaster, and John Robinson, the Warning Coordination Meteorologist (WCM)...both of the National Weather Service (NWS) in Little Rock.

All graphics and photos were contributed by employees at the NWS in Little Rock except where noted.

On the cover: Do you know when severe storms are approaching your area? Does bad weather tend to catch you off-guard? You might not be as weather aware as you think. For more information, go to pages 6-9.

Cover photo: The photo illustrates a lack of weather awareness. In reality, the woman reading the book was not present when the picture was taken. The woman is Amie Browne, a Meteorological Intern at the National Weather Service in Little Rock, Arkansas. The tornado photo is courtesy of Jerry Roberson. The tornado occurred on January 17, 1999 near Oil Trough, Arkansas.

Straight-line winds - Generally, any wind that is not associated with rotation; used mainly to differentiate thunderstorm winds from tornadic winds. Straight-line winds originate as a downdraft of rain-cooled air, which reaches the ground and spreads out rapidly, producing a potentially damaging gust of wind up to 100 mph. In recent years, there have been several occasions on which winds greater than 100 mph have been measured.

Suction vortex - A small but very intense vortex within a tornado circulation. Several suction vortices typically are present in a multiple-vortex tornado. Much of the extreme damage associated with violent tornadoes is attributed to suction vortices.

Supercell - A relatively long-lived thunderstorm with a persistent rotating updraft. Supercells are rare, but are responsible for a remarkably high percentage of severe weather events - especially tornadoes, extremely large hail, and damaging wind storms.

Tornado - A violently rotating column of air in contact with the ground.

Towering cumulus - A large cumulus cloud with great vertical development, usually with a cauliflower-like appearance, but lacking the characteristic anvil of a cumulonimbus cloud.

Updraft - A small-scale current of rising air. If the air is sufficiently moist, then the moisture condenses to become a cumulus cloud or an individual tower of a towering cumulus or a cumulonimbus.

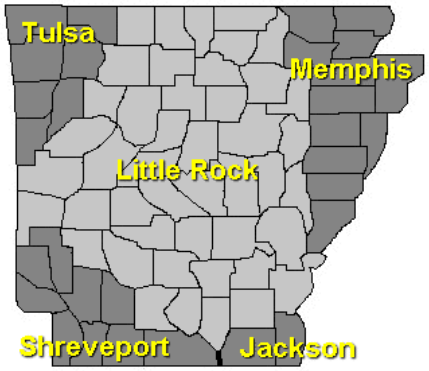
Upslope flow - Air that flows toward higher terrain, and hence is forced to rise.

Virga - Streaks or wisps of precipitation falling from a cloud but evaporating before reaching the ground.

Wall cloud - A local, often abrupt lowering from the rain-free base of a thunderstorm. Wall clouds can range from a fraction of a mile up to nearly 5 miles in diameter, and normally are found on the south or southwest side of the thunderstorm. When seen from within several miles, many wall clouds exhibit rapid upward motion and counterclockwise rotation. Rotating wall clouds usually develop before strong or violent tornadoes, by anywhere from a few minutes up to nearly an hour. Wall clouds must be monitored visually for signs of persistent, sustained rotation.

Waterspout - In general, a tornado occurring over water. Specifically, it normally refers to a small, relatively weak rotating column of air over water beneath a cumulonimbus cloud or a towering cumulus cloud. (Waterspouts are most frequently observed in shallow waters off the coasts of Texas and Florida. However, they have occurred in Arkansas on some of the larger lakes, and on a few occasions, in the Arkansas River.)

(The terms in this glossary were taken from several National Weather Service publications. This is not an all-inclusive list of all terms associated with severe weather. The terms here were selected because they are the most frequently used in Arkansas -- in weather summaries; and in interviews with the news media.)



As shown in the graphic to left, several offices issue severe thunderstorm and/or tornado warnings for Arkansas. The majority of counties (45) are served by the NWS in Little Rock...with NWS offices outside of Arkansas serving the remaining 30 counties.

Contacts

Renee Fair, MIC
John Robinson, WCM
NWS Little Rock, AR (501) 834-0308

Jim Belles, MIC or Rich Okulski, WCM
NWS Memphis, TN (901) 544-0399

Steven Piltz, MIC or Ed Calianese, WCM
NWS Tulsa, OK (918) 838-7838

Armando Garza, MIC or Mark Frazier, WCM
NWS Shreveport, LA (318) 631-3669

Alan Gerard, MIC or James Butch, WCM
NWS Jackson, MS (601) 936-2189

MIC - Meteorologist-in-Charge
WCM - Warning Coordination Meteorologist

Inversion - Usually used in reference to temperature; an increase in temperature with height (which is the reverse of what usually occurs in the atmosphere).

Mammatus clouds - Rounded, sack-like protrusions hanging from the underside of a cloud (usually a thunderstorm anvil). These clouds do not produce severe weather. They often accompany severe thunderstorms, but may accompany non-severe thunderstorms as well.

Mesoscale Convective Complex (**MCC**) - A large complex of thunderstorms, generally round or oval-shaped, which normally reaches peak intensity at night. An MCC must meet certain criteria for size, duration, and shape. MCCs typically form during the afternoon and evening in the form of several isolated thunderstorms, during which the potential for severe weather is greatest. During peak intensity, the primary threat shifts toward heavy rain and flooding.

Mesoscale Convective System (**MCS**) - A term often used to describe a cluster of thunderstorms that does not meet the size, duration, or shape criteria of an MCC. It is a complex of thunderstorms, which may be round-shaped or in a line, and normally persists for several hours or more.

Mesocyclone - A region of rotation, typically 2 to 6 miles in diameter, often found on the southwest part of a supercell. The circulation of a mesocyclone covers an area much larger than the tornado which MAY develop within it. This is technically a radar term defining a signature of rotation on Doppler radar that meets specific criteria for magnitude, vertical depth, and duration.

Microburst - A small, concentrated downburst affecting an area less than about 2.5 miles across. Most microbursts are rather short-lived (5 minutes or so), but on rare occasions have been known to last up to 30 minutes.

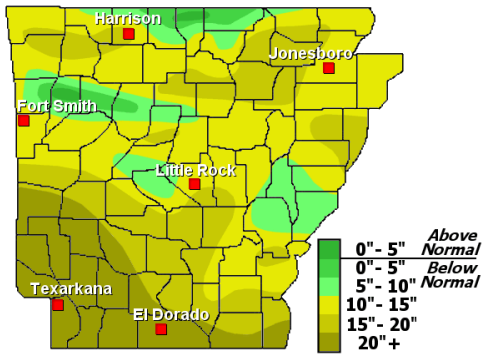
Outflow boundary - A boundary separating thunderstorm-cooled air (outflow) from the surrounding air; similar in effect to a cold front, with the passage marked by a wind shift and usually a drop in temperature. Outflow boundaries may persist for 24 hours or more after the thunderstorms that generated them dissipate, and may travel hundreds of miles from their area of origin. New thunderstorms often develop along outflow boundaries, especially near the point of intersection with another boundary (cold front, dry line, another outflow boundary).

Overrunning - Relatively warm moist air moving above another air mass of greater density (colder air). Embedded thunderstorms sometimes develop in such a pattern; severe thunderstorms (mainly with large hail) can occur, but tornadoes are unlikely.

Pulse storm - A thunderstorm within which a brief period (pulse) of strong updraft occurs, during and immediately after which the storm produces a short episode of severe weather. These storms generally are not tornado producers, but often produce large hail and/or damaging winds.

Risks (Severe Thunderstorm) - The Storm Prediction Center (SPC) assesses risks of severe thunderstorms in its convective outlooks. The risks are for a severe weather event occurring within 25 miles of any given point and are as follows:

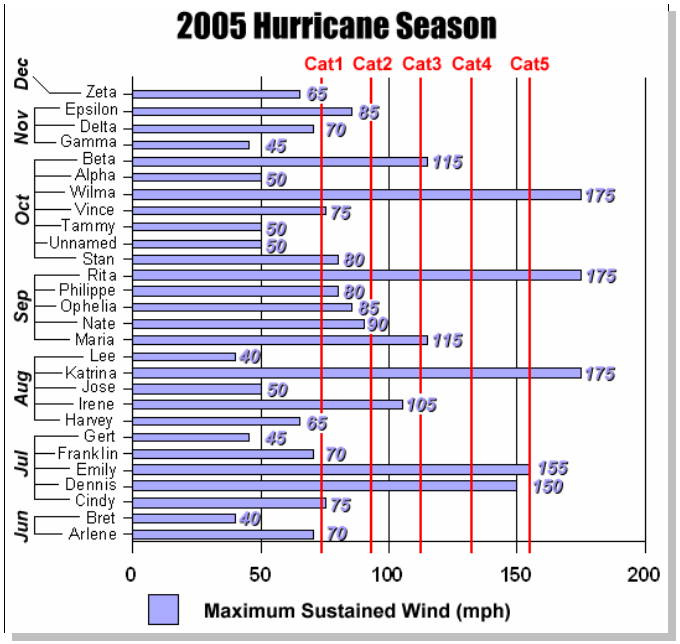
Rita also produced 3 to 6 inches of rain in much of the state (except the northwest). This temporarily ended a drought which had lingered since the early Spring.



However, there were no rainfall events quite like Rita the remainder of 2005...and the drought re-emerged. By the end of the year, parts of southwest Arkansas had rainfall deficits exceeding 20 inches.

In the picture: Precipitation departures from normal in 2005.

Rita was one of a record 28 storms in the Atlantic basin in 2005 (the previous record was 21 storms in 1933). Katrina was perhaps the most devastating storm, making landfall about a month prior to Rita (on August 29th). Katrina left thousands of people homeless along the southeast Louisiana and Mississippi Gulf Coasts...and flooded the city of New Orleans.

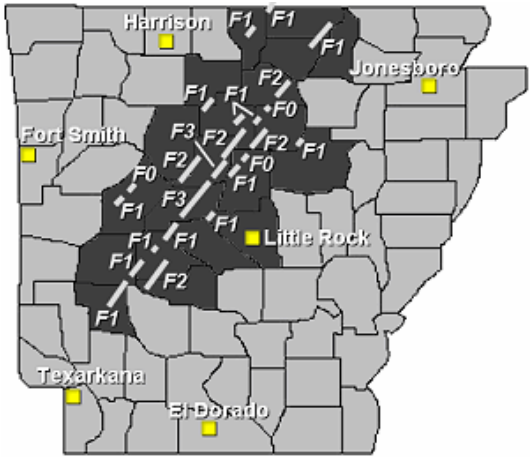


In the picture: There were 28 named storms during the 2005 hurricane season. Of these storms, 14 reached at least Category 1 (sustained wind of 74-95 mph) status...with 7 major storms (at least a Category 3 status with sustained winds of 111-130 mph).

Severe Weather in Arkansas 2006

Air mass thunderstorm - Generally, a thunderstorm not associated with a front or similar type of weather feature. Air mass thunderstorms typically are associated with warm, tropical air in the summer months; they develop during the afternoon in response to heating, and dissipate rather quickly after sunset. They generally are less likely to be severe than other types of thunderstorms.
Anvil - The flat, spreading top of a thunderstorm.
Approaching severe - A thunderstorm which contains winds of 40 to 57 mph or hail around 1/2 inch in diameter.
Bow echo - On radar, a line of thunderstorms that bulges outward into a bow shape. Damaging thunderstorm winds often occur near the center of a bow echo.
Box - A severe thunderstorm watch or tornado watch. The term derives from the fact that a watch takes the shape of a rectangle or parallelogram when plotted on a map.
Cap - A layer of warm air, several thousand feet above the surface, which suppresses or delays the development of thunderstorms. If the air is unstable enough, explosive thunderstorm development can occur if the cap is removed or weakened (for example, when colder air moves in).
Cold air funnel - A funnel cloud or (rarely) a small, relatively weak tornado that can develop from a shower or thunderstorm when the air aloft is unusually cold (hence the reference to "cold air").
Convection - In meteorology, this term is used most often to describe the vertical transport of heat and moisture, especially by updrafts and downdrafts in unstable air. Showers and thunderstorms are forms of convection.
Cumulonimbus cloud - A cloud characterized by strong vertical development in the form of mountains or huge towers, topped at least partially by a smooth, flat anvil. This type of cloud is more commonly known as a thunderstorm or thunderhead.
Cumulus - Detached clouds, generally dense and with sharp outlines, showing vertical development in the form of domes, mounds, or towers. Tops normally are rounded while bases are more horizontal. Cumulus clouds may grow into towering cumulus or cumulonimbus clouds.

Don't Miss That Call



On November 27, 2005...a large severe weather outbreak occurred in Arkansas. There were 24 tornadoes spawned, and extensive structural damage...but only 1 fatality. While the death toll was low, it could have been higher if not for the telephone. How come?

In the picture: Where tornadoes tracked on November 27, 2005.

When the National Weather Service surveyed storm damage in tornado ravaged areas, a number of people admitted they found out about Tornado Warnings through phone calls from loved ones. It is likely that the phone calls were not made immediately after the warnings were issued. Fortunately, warning lead times (before tornadoes arrived in any one location) averaged 22.5 minutes...well above the national average. If lead times were much less, would the phone calls have come too late?

It Won't Happen To Me

It is believed that the slow response to warnings may have been due in part to a lack of severe weather (especially tornadoes)

Some of the strongest thunderstorm winds reported during 2005 included:

98 mph at Kerr (Lonoke Co.).

86 mph at Pocahontas (Randolph Co.).

81 mph from Centerton to Bentonville (Benton Co.), Holiday Island (Carroll Co.), Barling (Sebastian Co.), a second time at Centerton (Benton Co.), and 2 miles southeast of Ozark (Franklin Co.)

79 mph at Fort Smith (Sebastian Co.).

75 mph near Eros (Marion Co.), at Crossett (Ashley Co.) and at Rector (Clay Co.).

In the picture: A barn was blown onto Highway 125 near Eros (Marion County) by damaging straight-line winds during the evening of 01/12/2005. The picture is courtesy of Randy Ates.

Winds such as these occur every year due to thunderstorms in Arkansas, and damage associated with such winds is often mistaken for tornado damage.

Large Hail

No deaths or injuries due to hail were reported in Arkansas in 2005.

The largest hailstones reported during the year included:

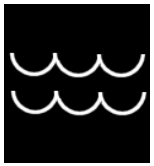
2½ inches in diameter (tennis ball size) at Hot Springs Village (Garland Co.).

2 inches in diameter (lime size) at Blytheville (Mississippi Co.) and Jessieville (Garland Co.).

Not Just Tornadoes

Have you ever gone to a ball game, and heard thunder in the distance...but the game resumed until it rained? If you answered "yes", you are not alone.

There are still a lot of people who do not realize that thunder is caused by lightning...and that lightning can strike up to 10 miles away from an approaching storm. Ironically, 10 miles is about the audible range of thunder. So, if thunder is heard...lightning should be a concern. To learn more about lightning, go to http://www.lightningsafety.noaa.gov.



So you are traveling and approach water moving across the road. Do you drive through the water to save time? If you answered "yes", you are not alone.

In May, 2002...a car carrying a grandmother and her two grandchildren was swept off the road by a swollen creek in rural Scott County, Arkansas. The grandmother lost her life after she exited the car to find help. The grandchildren were unharmed.

In the picture: A car was washed off the road in southwest Scott County (western Arkansas) and was swept downstream (i.e. along Haws Creek) on 05/27/2002.

While water looks non-threatening, two feet of water will float an average car. Also, estimating the depth of water can be difficult... especially at night. Weighing these factors, driving through water is very risky. The National Weather Service has a simple slogan: "Turn Around Don't Drown" ™. For more about the slogan and on flash flooding in general, go on-line to the following addresses:

http://www.nws.noaa.gov/floodsafety
http://www.srh.noaa.gov/tadd

38. 2.5 miles east-southeast of Buford to 4 miles south-southeast of Mountain Home (Baxter Co.), November 27th, 6:15 PM – A weak (F1) tornado had a path length of 3.7 miles.

39. 1.7 miles south of Williams Junction to 14.5 miles west-southwest of Roland (Perry and Pulaski Cos.), November 27th, 6:25 PM – A weak (F1) tornado had a path length of 3 miles.

40. 0.8 mile north-northeast of Springfield to 6.5 miles north-northeast of Bee Branch (Conway, Faulkner, and Van Buren Cos.), November 27th, 6:27 PM – A strong (F2) tornado had a path length of 21.8 miles.

In the picture: Tin from a barn was strewn through the trees near Bee Branch (Van Buren County) following a strong (F2) tornado on 11/27/2005.

41. 4 miles north-northwest of Vidette, AR, to 2 miles northeast of Bakersfield, MO (Fulton Co., AR, and Ozark and Howell Cos., MO), November 27th, 6:40 PM – A weak (F1) tornado had a total path length of 4.3 miles – 1.3 miles in Arkansas and 3 miles in Missouri.

42. 6 miles south-southwest of Shirley to 2.8 miles south of Shirley (Van Buren Co.), November 27th, 6:55 PM – A weak (F1) tornado had a path length of 3.7 miles.

43. 2.8 miles south of Wooster to 1.7 miles north-northeast of Greenbrier (Faulkner Co.), November 27th, 6:59 PM – A weak (F1) tornado had a path length of 7.7 miles.

In the picture: The dugout at a junior high school in Greenbrier (Faulkner County) was destroyed by a weak (F1) tornado on 11/27/2005.

44. 4.3 miles southwest of Higden to 1.6 miles southwest of Higden (Cleburne Co.), November 27th, 7:02 PM – A weak (F1) tornado had a path length of 2.7 miles.

When you think of severe weather, baking bread does not come to mind. But thinking of bread might make you understand how severe storms tick.

Watches

To bake severe thunderstorms, the recipe calls for moisture (from the Gulf of Mexico), instability (making air parcels buoyant), and lift (forcing air parcels aloft). The whole idea is to create rising air to make clouds grow. If the right ingredients are on hand, a **Watch** may be issued...meaning that **severe storms are possible but not imminent**.

Warnings

If the right ingredients have come together (have been well mixed), and storms are baking...you are now in Warning mode. A **Warning** means that storms have become severe, and **severe weather is imminent**.

What is Severe?

Severe thunderstorms produce at least one of the following: (1) large hail (i.e. penny size hail or larger), (2) wind gusts of 58 mph or greater (i.e. which will down trees and large tree limbs), and (3) tornadoes.

In the picture: Penny size hail or larger is one form of severe weather.

23. 3 miles southwest of Manning to 0.5 mile east-southeast of Manning (Dallas Co.), November 14th, 1:42 PM – A weak (F1) tornado had a path length of 3.2 miles.

24. 6.2 miles south-southwest of Pine Bluff to 5.5 miles south-southwest of Pine Bluff (Jefferson Co.), November 15th, 2:20 PM – A weak (F0) tornado had a path length of 0.7 mile.

25. 2.8 miles north-northeast of Gillett to 5.5 miles southeast of Ethel (Arkansas Co.), November 15th, 2:52 PM – A weak (F1) tornado had a path length of 16.5 miles.

26. 7 miles south of DeWitt to 2.2 miles west of DeLuce (Arkansas Co.), November 15th, 2:55 PM – A weak (F1) tornado had a path length of 3.5 miles.

27. 2 miles south of Bluffton to 2.5 miles southwest of Briggsville (Yell Co.), November 27th, 3:40 PM – A weak (F1) tornado had a path length of 4.5 miles.

28. 4.5 miles southwest of Danville to 1.8 miles southwest of Danville (Yell Co.), November 27th, 3:57 PM – A weak (F0) tornado had a path length of 2.7 miles.

29. 3 miles south-southwest of Kirby to 2 miles north of Welsh (Pike and Montgomery Cos.), November 27th, 4:25 PM – A weak (F1) tornado had a path length of 17 miles. One person was injured.

30. 4 miles north-northeast of Welsh to 2 miles southwest of Crystal Springs (Montgomery and Garland Cos.), November 27th, 4:49 PM – A weak (F1) tornado had a path length of 8 miles.

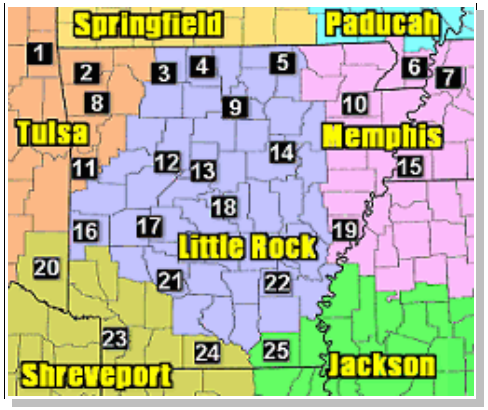
31. 2 miles north of Bear to 3 miles north-northeast of Bear (Garland Co.), November 27th, 5:10 PM – A weak (F1) tornado had a path length of 1.2 miles.

32. 3 miles southeast of Bonnerdale to 3 miles southeast of Mountain Pine (Hot Spring and Garland Cos.), November 27th, 5:20 PM – A strong (F2) tornado had a path length of 18 miles. One person was injured.

In the picture: A brick home was ripped open by a strong (F2) tornado near Sunshine (Garland County) on 11/27/2005. A tree also fell through the house.

33. 0.8 mile east-southeast of Chimes to 11.1 miles east of Witts Spring (Van Buren and Searcy Cos.), November 27th, 5:23 PM – A weak (F1) tornado had a path length of 5.5 miles.

How do you receive watches and warnings from the National Weather Service (NWS)?



The NWS has its own radio network with weather information presented 24 hours a day, 7 days a week. **NOAA Weather Radio All Hazards** is considered The Voice of the National Weather Service.

In the picture: As of January, 2006...there were 25 NOAA Weather Radio transmitters up and running across Arkansas: (1) Grove OK...162.500 MHz, (2) Springdale...162.400 MHz, (3) Harrison...162.525 MHz, (4) Yellville...162.500 MHz, (5) Cherokee Village...162.475 MHz, (6) Wardell MO...162.525 MHz, (7) Dyersburg TN...162.500 MHz, (8) Fayetteville...162.475 MHz, (9) Mountain View...162.450 MHz, (10) Jonesboro...162.550 MHz, (11) Fort Smith...162.550 MHz, (12) Russellville...162.525 MHz, (13) Morrilton...162.475 MHz, (14) Russell...162.400 MHz, (15) Memphis TN...162.475 MHz, (16) Mena... 162.400 MHz, (17) Mount Ida...162.425 MHz, (18) Little Rock...162.550 MHz, (19) Marvell...162.525 MHz, (20) Broken Bow OK...162.450 MHz, (21) Gurdon... 162.475 MHz, (22) Star City...162.400 MHz, (23) Texarkana...162.550 MHz, (24) El Dorado...162.525 MHz, and (25) Fountain Hill...162.475 MHz.

To receive information, look for radios equipped with WRSAME (Weather Radio Specific Area Message Encoding) at electronics stores. Program the county Federal Information Processing System code to into the radio (prefix with “005") and you will be

9. 8.5 miles south of Gillett to 7.5 miles southeast of Reydell (Arkansas and Jefferson Cos.), September 24th, 3:19 PM – A weak (F0) tornado had a path length of 8.5 miles. This tornado was associated with Tropical Depression Rita.

10. 2 miles east-southeast of Bevis Corner to 0.8 mile south of Kerr (Lonoke Co.), September 24th, 4:40 PM – A strong (F2) tornado had a path length of 7.2 miles. Five people were injured. This tornado was associated with Tropical Depression Rita.

In the picture: A mobile home was destroyed by a strong (F2) tornado near Bevis Corner (Lonoke County) on 09/24/2005.

11. 1 mile west of Eudora to 2 miles northwest of Eudora (Chicot Co.), September 24th, 5:54 PM – A weak (F1) tornado had a path length of 1 mile. This tornado was associated with Tropical Depression Rita.

12. 4 miles west-southwest of Parnell to 5.7 miles north-northwest of Jacksonville (Lonoke and Pulaski Cos.), September 24th, 5:59 PM – A weak (F1) tornado had a path length of 5.7 miles. This tornado was associated with Tropical Depression Rita.

13. 5 miles northeast of Macon to 1.7 miles west of Otto (Pulaski and Faulkner Cos.), September 24th, 6:09 PM – A weak (F1) tornado had a path length of 8 miles. This tornado was associated with Tropical Depression Rita.

14. 6 miles west-southwest of Lake Village to 7 miles west of Lake Village (Chicot Co.), September 24th, 6:29 PM – A weak (F1) tornado had a path length of 2 miles. This tornado was associated with Tropical Depression Rita.

15. 2.6 miles south-southeast of Cleveland to 2.5 miles south-southwest of Cleveland (Conway Co.), September 24th, 6:48 PM – A strong (F2) tornado had a path length of 1 mile. This tornado was associated with Tropical Depression Rita.

In the picture: A mobile home was removed from its foundation and thrown across the street into a church by a strong (F2) tornado about 2 miles south of Cleveland (Conway County) on 09/24/2005.

Below is a breakdown of the number of tornadoes that have been documented for each county in Arkansas since 1950. Tornado deaths that have occurred are in brackets "( )".

Arkansas	33(0)	Garland	26(0)	Newton	8(0)
Ashley	25(6)	Grant	16(0)	Ouachita	16(0)
Baxter	18(3)	Greene	25(2)	Perry	12(0)
Benton	31(0)	Hempstead	18(5)	Phillips	16(0)
Boone	11(1)	Hot Spring	31(0)	Pike	13(0)
Bradley	17(7)	Howard	23(10)	Poinsett	32(8)
Calhoun	12(0)	Independence	35(8)	Polk	23(1)
Carroll	8(0)	Izard	20(2)	Pope	17(1)
Chicot	25(1)	Jackson	46(5)	Prairie	23(8)
Clark	30(6)	Jefferson	25(1)	Pulaski	66(13)
Clay	16(1)	Johnson	32(2)	Randolph	10(0)
Cleburne	26(3)	Lafayette	8(0)	St. Francis	17(5)
Cleveland	8(0)	Lawrence	21(1)	Saline	32(12)
Columbia	25(3)	Lee	10(0)	Scott	6(0)
Conway	29(4)	Lincoln	15(5)	Searcy	11(0)
Craighead	30(37)	Little River	11(1)	Sebastian	25(16)
Crawford	18(0)	Logan	19(1)	Sevier	14(0)
Crittenden	13(6)	Lonoke	54(18)	Sharp	15(0)
Cross	15(5)	Madison	8(2)	Stone	17(5)
Dallas	18(1)	Marion	15(6)	Union	27(3)
Desha	20(0)	Miller	18(0)	Van Buren	25(1)
Drew	11(1)	Mississippi	39(5)	Washington	19(1)
Faulkner	46(11)	Monroe	15(0)	White	59(59)
Franklin	13(0)	Montgomery	9(0)	Woodruff	29(30)
Fulton	17(4)	Nevada	15(0)	Yell	23(0)

Total Tornadoes: 1624
Total Deaths: 337

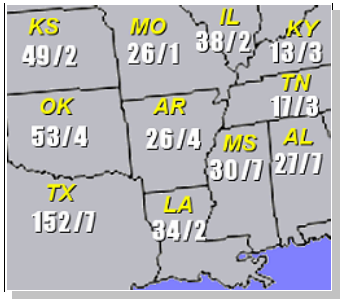
In 2005, there were 52 tornadoes with 3 tornado deaths. There were 2 deaths in Union County (last death in 1978) and 1 death in Conway County (last death in 1982).

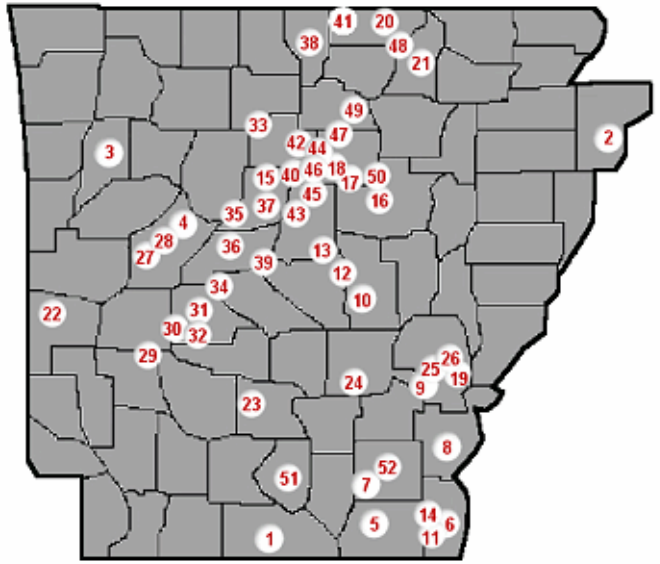
Tornadoes

There were 52 tornadoes in 2005...with the tornadoes causing 3 deaths and 33 injuries.

Normally, there are 26 tornadoes in Arkansas annually...with 4 lives lost to tornadoes.

In the picture: The left number represents how many tornadoes occur per year...with the right number reflecting how many people are killed by tornadoes.





In the picture: A plot showing where tornadoes (52 of them) occurred in 2005. The numbers to left match the tornadoes listed on the following pages.